



Creatonotos gangis ♂
displaying its coremata

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PLANNING AND ORGANIZATION MEETINGS

A quarterly meeting is scheduled in order to plan club activities and the magazine.
See BOIC Programme.

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Membership fees are \$30 for individuals, schools and organizations.

AIMS OF ORGANIZATION

- To establish a network of people growing butterfly host plants;
- To hold information meetings about invertebrates;
- To organize excursions around the theme of invertebrates e.g. butterflies, native bees, ants, dragonflies, beetles, freshwater habitats, and others;
- To promote the conservation of the invertebrate habitat;
- To promote the keeping of invertebrates as alternative pets;
- To promote research into invertebrates;
- To encourage the construction of invertebrate friendly habitats in urban areas.

MAGAZINE DEADLINES

If you want to submit an item for publication the following deadlines apply:

March issue – February 1st

June issue – May 1st

September issue – August 1st

December issue – November 1st

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COVER

Cretonotos gangis ♂ – Painting by Lois Hughes from image supplied by Lee Curtis



Magazine of the Butterfly and Other Invertebrates Club #65 – Page 2

FROM THE PRESIDENT

By an unplanned combination of events, we have a series of rather lengthy and, at times, complex articles in this our 65th edition of the newsletter/magazine. We thank Peter Hendry, Wesley Jenkinson, Hilton Selvey, Kelvyn Dunn and Robert Whyte for their contributions which record information gained over countless hours of work.

I again urge members to write in with their snippets of observations or experiences. These need not be lengthy but will be most welcome.

At the Club's Annual General Meeting (AGM) in April, Jennifer Singfield indicated that she would be willing to undertake secretarial roles on her return from overseas later this year. The management committee voted to accept her offer at a recent meeting. Jennifer has had a great deal of experience working with voluntary organisations and her addition to our team will undoubtedly benefit the Club. She is organising the Club's first trivia night and I urge you to support her in any way you can.

The motion to increase our annual subscription to \$30.00 was carried at the AGM. This sum will now (just) meet the cost of publication and distribution of "Metamorphosis Australia". Profits from the sales of printed materials and plants go towards meeting the other costs we experience in managing our activities.

Do you know of a garden, park or bushland area that is suitable for a club excursion? Please contact Alisha with your suggestion. Best wishes Ross

IN THIS ISSUE

Creature Feature - The Australian Arctiid Moths (Lepidoptera: Noctuoidea: Erebidae) with emphasis on <i>Creatonotos gangis</i>	4
President's Report for 2012 AGM.....	15
Life history notes on the Lyell's Swift, <i>Pelopidas lyelli lyelli</i> (Rothschild, 1915) Lepidoptera: Hesperidae	16
Tiger Crane Fly, <i>Nephrotoma australasiae</i> (Skuse, 1890) Diptera: Tipulidae.....	18
Field notes on butterflies in the Society Islands, French Polynesia: Part 2: Tahiti Nui (Section 2 – a transect study on Mt Marau) ...	20
More than a botanical refuge - Myall Park Botanic Garden via Glenmorgan, Queensland	32
Facebook	39
B.O.I.C Programme.....	39



The Australian Arctiid Moths (Lepidoptera: Noctuoidea: Erebidae) with emphasis on *Cretonotos gangis* - Peter Hendry

While many of our non-scientific readers will find parts of this article heavy going, I urge them to bear with me as many interesting facts are contained herein.

In the *Checklist of Lepidoptera of Australia* (1996), (herein referred to as the Checklist) the worldwide superfamily Noctuoidea contains nine families, Oenosandridae, Doidae, Notodontidae, Thyretidae, Lymantriidae, Arctiidae, Aganaidae, Herminiidae and Noctuidae with Doidae and Thyretidae noted as not recorded from Australia. Of these the Arctiidae contain 95 genera and 303 species. The Checklist divides the Arctiidae into three subfamilies: Lithosiinae, 78 genera, 218 species, Arctiinae, 13 genera, 33 species, and Ctenuchinae, four genera, 52 species. The Ctenuchinae are further divided into two tribes, Syntomiini and Eucchromiini. In the Checklist, Edwards states that the subfamily classification of the Arctiidae is very uncertain and further studies will change our view.

In recent years overseas studies have pointed to a complete reordering of the superfamily Noctuoidea. Zahiri *et al.* (2011)(a), continuing on from previous work reordered the Noctuoidea into six families, Oenosandridae, Notodontidae, Euteliidae, Erebidae, Nolidae and Noctuidae. These studies have led to the raising of the Erebiniae, a subfamily of Noctuidae, to family status Erebidae. (I note that the Checklist has Erebiniae listed only as a synonym of Catocalinae a subfamily of Noctuidae). Recently, Zahiri *et al.* (2011)(b) present a new phylogeny for Erebidae consisting of 18, moderate to strongly supported, subfamilies. Included in these subfamilies are four families listed in the Checklist: Lymantriidae, Arctiidae, Aganaidae and Herminiidae. Some subfamilies of Noctuidae e.g. Rivulinae and Hypeninae have been extracted from the Noctuidae and placed in Erebidae.

What this means to the Australian Arctiids as the above arrangement becomes fully accepted is: the family Arctiidae becomes a subfamily of Erebidae, namely Arctiinae, the old subfamily, Lithosiinae becomes a tribe, Lithosiini and the old subfamily, Arctiinae is split into two tribes, Arctiini and Nyctemerini, (though the status of Nyctemerini needs to be clarified further, Zahiri *et al.* (2011)(b)). Also under this arrangement the old subfamily Ctenuchinae disappears, leaving the tribes Syntomini (I note a difference in spelling between the Checklist and Zahiri *et al.* (2011)(b)) and Eucchromiini, with subtribes Syntomina and Eucchromiina. Several members of the Arctiids continue to be classed as *incertae sedis* (of uncertain position) and it is clear that more work needs to be done before all the Arctiids are fully sorted.

The Arctiids are a fascinating group to study, with several traits similar to the Danaid butterflies. Both groups have mimics and take in pyrrolizidine alkaloids (PAs) as



larvae from their host plants. These PAs are used as a defense mechanism by making them unpalatable to predators. They are also used in producing pheromones to attract mates. In the case of the Danaids these pheromones are disseminated by “hair pencils”, which are extruded from the abdomen. While the Arctiids have a much more elaborate structure known as coremata, the size of which and the amount of pheromones they disseminate being dependent on the amount of PAs taken in during the larval stage (Boppre’ and Schneider, 1985).

In the case of *Cretonotos gangis*, the male coremata (illustration front cover), which can exceed its body length, is comprised of expandable air filled tubes, covered with slender, erect scales (Conner, 2009). It arises from an air-bladder located on the ventral side of the distal abdomen, formed from the intersegmental membrane between the 7th and 8th sternites (sclerotized segments of the ventral abdominal wall). In their retracted state, the coremata are invisible, being entirely hidden within the abdomen (Boppre’ and Schneider, 1989). Robinson (1962) records the female coremata as being small. Experiments with *C. gangis* have revealed a dual mating system. After sunset the males inflate their coremata and release pheromones. This attracts other males and as a group they all start emitting pheromones, which in turn attracts the females. On contacting a female the male deflates its coremata and mates. Amazingly, one to two hours after the formation of the group, unmated females start releasing pheromones to attract the unmated males (Conner, 2009)!

The Arctiids have a sound producing organ known as a tymbal organ. It produces ultrasonic clicks, which in most species consist of doublets of soundwaves, referred to as modulation cycles. The first half-modulation cycle is produced by the in-flexion of the tymbal organ and the second is produced by its out-flexion to its original state (Fullard and Fenton, 1997). Note the analogy with the tymbal organ in cicadas. Like the PAs, sounds are also used in courtship and defense. In courtship both males and females use sound. In some cases only sounds are used as the males of certain species lack a coremata and pheromones and some females are deprived of pheromones. In other cases both pheromones and sound are used. Arctiids that specialize for at least a portion of their larval life on plants containing PAs often use male scent-disseminating structures, with a PA-derived pheromone, in courtship. Arctiids that do not absorb PAs appear to favor ultrasound in their precopulatory interactions (Simmons and Conner, 1996). The use of sound as a defense mechanism pertains to their predation by bats. One scenario as to how this protection works is that after tasting a “clicking” moth that contains PAs and finding it unpalatable, bats avoid “clicking” moths. Another scenario is that the clicking sounds can jam the bats sonar.





Fig. 1. *Creatonotos gangis*



Fig. 2. *Aloa marginata*



Fig. 3. *Amerila crokeri*



Fig. 4. *Ardices (Spilosoma) curvata*



Fig. 5. *Argina astraeca*



Fig. 6. *Amata* sp.

A look at some species:

Erebidae: Arctiinae : Arctiini (Arctiidae: Arctiinae)

The adults of most species are coloured in white or orange, with red or black markings. The densely hairy larvae of many species, popularly known as



woolly bears, are often seen crawling rapidly over bare areas on the ground between the low-growing, herbaceous plants on which they feed (Common 1990).

Cretonotos gangis (Linnaeus, 1763) (Fig. 1), with its magnificent coremata has a wingspan of about 40mm. Also found overseas, Common (1990), gives its Australian distribution as north-western Australia, the Northern Territory and in north-eastern Queensland as far south as Mackay, though I have a specimen from further south at Maryborough and as recently as this month (April, 2012) J. Moss and W. Jenkinson collected several specimens west of Bundaberg. Common (1990) also states that specimens from the northwest tend to have smoky forewings and a high percentage have yellow instead of red abdomens. The eggs are yellow and round, and are laid in rows on the leaves of food plants. The hairy larvae are brown with a yellow stripe along the back. Soybeans (*Glycine max*, Fabaceae), rice (*Oryza sativa*, Poaceae) and maize (*Zea mays*, Poaceae) are listed as host plants (Herbison-Evans (a)). Overseas it has been recorded on coffee, groundnut, lucerne, *Brassica* spp. (Brassicaceae), *Ipomoea reptans* (Convolvulaceae), *Imperata cylindrica* (Poaceae) and sugar cane (*Saccharum officinarum*, Poaceae) (Boppre' and Schneider, 1989). In captivity the larvae developed properly on dandelion (*Taraxacum officinale*, Asteraceae) and wheat (*Triticum aestivum*, Poaceae) (Boppre' and Schneider, 1989).

Aloa marginata (Donovan, 1805) (Fig. 2), is included in Common (1990), as *Amsacta marginata*. This latter genus was shown in the Checklist to be a subjective synonym. It has a wingspan of about 40-50mm. The forewing is predominately white with black markings and a red costa. It is a very variable species with the southern forms having extensive black markings and the white may suffuse to pink (Common, 1990). Also found overseas, the Australian distribution is from north-western Australia, the Northern Territory and from Thursday Island, Queensland to Victoria and South Australia (Common, 1990). The larvae feed on plants from many families including: Asteraceae, Boraginaceae, Euphorbiaceae, Fabaceae, Plantaginaceae, Polygonaceae, and Portulacaceae (Herbison-Evans (b)).

Amerila crokeri (W.S. Macleay, 1826) (Fig. 3), is included in Common (1990) as *Rhodogastris crokeri*. This discrepancy came about due to a misidentified type species (Häuser and Boppre', 1997). With a wingspan of about 60mm it is the most widespread of the seven Australian species in this genus. Buck Richards, on his web page (A), has an unconfirmed record of the Asian species *A. astreus* from his home at Kuranda north Queensland. If confirmed this would bring the Australian total for this genus to eight. *A. crokeri* ranges from north-western Australia, the Northern Territory and Cooktown, Queensland, to northern New South Wales (Common, 1990). If molested, resting adults produce quantities of a frothy, orange fluid from their prothoracic glands, accompanied by a sizzling sound (Common, 1990). The froth not only has an aversive odor to humans but also contains PAs which are likely taste-repelling (Häuser and Boppre', 1997). This phenomenon applies



to all the *Amerila* and has been recorded from other Arctiids including *Cretonotos* (Boppre' and Schneider, 1989). Little appears to be known of the host plants for any of the *Amerila* and I found nothing recorded for *A. crokeri*. However, Holloway (1988) lists the following for *A. astreus*: *Dioscorea* (Dioscoreaceae), *Smilax* (Smilacaceae), *Ixora* (Rubiaceae), *Marsdenia* (Asclepiadaceae) and *Beaumontia* (Apocynaceae).

Ardices curvata (Donovan, 1805) (Fig. 4), is in the Checklist and Common (1990) as *Spilosoma curvata*. The genus *Ardices* Walker, 1855, was erected for a single species, *A. fulvohirta* Walker, 1855, from the Australian Region. This is now considered as a synonym of *A. galatignyi* (Le Guillou, 1841). *Ardices* generic status was considered doubtless until Turner, in his 1940 work, *Revision of Australian Arctiidae*, combined it with *Spilosoma* Curtis, 1825. This point of view was accepted by Edwards (1996) (in the Checklist), but Holloway in his 1979 work, *A survey of the Lepidoptera, biogeography and ecology of New Caledonia*, admitted a generic status for *Ardices* (Dubatolov, 2005). Dubatolov states that Hampson, in his 1901 work, *Catalogue of the Arctiidae (Arctinae) and Agaristidae in the collection of the British Museum*, found the most important character which can separate *Ardices* from both *Spilosoma* and *Spilarctia*; that being the presence of hairs on the surface of the eyes. Dubatolov also erected a new subgenus for *A. curvata*; *Australemyra*. I note that in the latest work in Australia, Marriott (2009) did not take up this name and stuck with *Spilosoma*.

A. curvata is a very variable species and Turner (1940) described a local race *A.c. athertonensis* from the Atherton Tableland. Dubatolov (2005), following on from this, proposed the possibility of four subspecies based on their geographical distribution; *A.c. athertonensis* from the Atherton Tableland North Queensland, *A.c. curvata* from Queensland and New South Wales, *A.c. vittata* from Victoria and mountains of New South Wales and *A.c. vigens* from Tasmania. Common (1990), while not proposing subspecies, also described three geographical races. *A. curvata* has a wingspan of about 35mm. The larva has brown hairs over most of the body, being noticeably darker on the first three segments. It has a yellow line down the back, and a black head. It eats various herbaceous plants including; Dandelions (*Taraxacum officinale*, Asteraceae), Beans (*Phaseolus vulgaris*, Fabaceae), Geranium (*Pelargonium x zonale*, Geraniaceae) and Nasturtiums (*Tropaeolum majus*, Tropaeolaceae) (Herbison-Evans (c)).

Argina astrea (Drury, 1773) (Fig. 5), is found commonly in the Northern Territory and in coastal and sub-coastal Queensland, it has a wide distribution in the Ethiopian, Oriental and Australian regions (Common, 1990). The larva is boldly patterned in black and white and feeds on the foliage and seedpods of *Crotalaria* (Fabaceae). This stunning moth, which resembles an aganaid, has a wingspan of about 40mm.





Fig. 7. *Asura lydia*



Fig. 8. *Asura zebrina*



Fig. 9. *Calamidia hirta*



Fig. 10. *Halone coryphoea*



Fig. 11. *Hectobrocha multilinea*



Fig. 12. *Hesychocha chionora*

Erebidae: Arctiinae : Syntomini and Euchromiini (Arctiidae: Ctenuchinae)

The adults can be easily recognized by their relatively narrow and elongate fore wings, small rounded hind wings, and elongate body. The wings are black with conspicuous orange or semitransparent spots, and the abdomen is nearly always ringed with orange and black or is brilliantly coloured with red, orange or metallic



blue (Common, 1990). The larvae are very similar to that of the Arctiini (Arctiinae), with dense, plumose secondary setae (hairs) arranged on verrucae (a wart-like prominence) (Common, 1990).

The tribe Syntomini contains three genera: *Amata* with 39 species, *Eressa* 7 species and *Ceryx* 2 species while the tribe Euchromiini contains one genus, *Euchromia*, with 4 species. The genus *Amata* has species that are very similar and it requires revision and clarification (Marriott, 2009). Reading the descriptions and comparing the available images is confusing, e.g. *Amata annulata* on Herbison-Evans web page (e), shows images (courtesy of the Macleay Museum, University of Sydney) all with yellow heads. Turner (1905) states that the head is black, which agrees with the illustration by Seitz in *The Macrolepidoptera of The Indo-Australian Fauna: Noctuidiform Phalaenae*, 1912. However, this colour difference may well be a sexual difference. One specimen in my collection is confusing as it has variable forewings (Fig 6). This may be an example of male/female gynandromorphy (male one side, female the other)! Of the other three genera the *Eressa* are represented in Australia by seven species, with *Ceryx* having two and *Euchromia* having four.

Erebidae: Arctiinae : Lithosiini (Arctiidae: Lithosiinae)

With 218 species, the Lithosiini is the most populous group within the Arctiids. Of the 78 genera most are endemic, but a few are shared with New Guinea and the Oriental region. Aposematic (warning) coloration is characteristic of most species, with orange, red and black pre-dominating. The larvae usually feed on lichens, but occasionally on mosses or algae, and a few are thought to feed on other materials. The setae are often not as dense as in the other groups (Common, 1990).

Asura lydia (Donovan, 1805) (Fig. 7), occurs from southern Queensland through New South Wales into Victoria. The Atlas of Living Australia web site (a) shows a record from Western Australia. Under state/province it states Western Australia, supplied as “New South Wales”. The coordinates given are latitude -32.0, longitude 115.8. While the collector/s of this 1903 record is not given, I believe they would have known that they were in New South Wales and not Western Australia! If the longitude was not 115.8 but 151.8 instead, the location would be between Barrington Tops and Gloucester New South Wales! A more likely scenario. The densely hairy larvae occur under logs on the ground, and may feed on litter or lichens. They pupate in flimsy, oval cocoons of silk covered with fine, short, dark setae (hairs from the larvae) (Common, 1990). *A. lydia* has a wingspan of about 22mm.

Asura zebrine (Hampson, 1914) (Fig. 8) occurs from southeast Queensland into New South Wales to north of Wollongong (The Atlas of Living Australia (b)). As with other members of *Asura* the male antennae are bipectinate



(comb-like teeth on each side) to the tip (Common, 1990); the female antennae are filiform (threadlike). *A. zebrine* has a wing span of about 20mm.

Calamidia hirta (Walker, 1854) (Fig. 9), is sexually dimorphic, the females having dull white wings and in the males the labial palpi (a paired segmented sensory appendage, near the “mouth”) are long (Common, 1990). Meyrick (1886), questioning that the two sexes were of the same species and having seen few species, stated he had no authority for uniting them in the face of the great difference in palpi and colouring. He went on to describe the male as *Calamidia salpinctis*. (This is now a junior synonym of *C. hirta*). It ranges from the Atherton Tableland, Queensland to Victoria and Tasmania (Common, 1990). The wingspans are as follows ♂36mm, ♀52mm (Marriott, 2009).

Halone coryphoea, Hampson, 1914 (Fig. 10), is one species in which the forewings are cryptically patterned and conceal the brightly coloured hind wings while at rest. It is one of 12 Australian species in the genus with mainly a southeastern distribution. *H. coryphoea* occurs from the tablelands of southern Queensland through New South Wales to Victoria (Common, 1990). Though Common states it occurs in Victoria and the Atlas of Living Australia web site (c) shows a record from that state, it is missing from Marriott (2009) *Moths of Victoria*. The larva is thought to feed on lichen. *H. coryphoea* has a wingspan of about 21mm.

Hectobrocha multilinea, T.P. Lucas, 1890 (Fig. 11), is one of four in the genus and very similar to *H. pentacyma*, Meyrick, 1886. In fact Lower (1897) synonymized them stating that specimens of *H. multilinea* sent to him from Brisbane agreed so well with the description of *H. pentacyma* that he had no hesitation in placing them together and noted Meyrick’s species was founded on a single species. However this ignored the keys to three of the *Hectobrocha* by Lucas (1892), in which he highlighted the difference as being in the hindwing. The hindwing of *H. multilinea* has a grey border while that of *H. pentacyma* is without. Lucas (1890) described the larva of *H. multilinea* as being brown, hairy, on rocks and probably feeds on lichens. Both species have a wingspan in the range of 25-32mm. *H. multilinea* ranges from southeast Queensland to northern New South Wales while *H. pentacyma* occurs in Queensland from at least as far north as Maryborough, through New South Wales and into Victoria.

Hesychopa chionora (Meyrick, 1886) (Fig. 12), The Atlas of Living Australia (e) shows a distribution from Cairns, North Queensland, to southern New South Wales. Marriott (2009) shows a single record from East Gippsland, Victoria. Working in subtropical rainforest in southeast Queensland, Ashton *et al.* (2011) show that, with a specimen count of 30 plus, *H. chionora* occurred in an altitudinal range from 700 -1100 metres above sea level. *H. chionora* has a wingspan in the range of 28-36mm.





Fig. 13. *Scoliacma bicolora*



“Dark Form”

Fig. 14. *Termessa conographa*



“Pale Form”

Fig. 15. *Termessa conographa*



Fig. 16. *Termessa discrepans*



Fig. 17. *Termessa nivosa*



Fig. 18. *Oeonistis altica*

Scoliacma bicolora (Boisduval, 1832) (Fig. 13). Though Meyrick (1886) noted Boisduval’s spelling of “bicolora” as an inadmissible solecism and referred to it as “bicolor”, Boisduval’s name has stuck. Known as the Red Footman, it has a distribution from the Atherton Tableland and Eungella in northern Queensland and from southern Queensland to Victoria, south east South Australia



and Tasmania (Common, 1990). As with *Asura lydia* The Atlas of Living Australia web site (d) shows a record from Western Australia with the same coordinates and state/province reference as *A. lydia*. This record is from 1910 and my comments apply equally to this record as to that of *A. lydia*. The larva has been recorded feeding on moss, lichen and liverwort (Common, 1990). *S. bicolora* has a wingspan of about 30mm.

Termessa conographa (Meyrick, 1886) occurs from the Atherton Tableland and central Queensland to central New South Wales (Common, 1990). *T. conographa* has two forms. Britton (2009) refers to the forms as “Dark” and “Pale”-- the “Dark” form has a solid black marking on the forewing (Fig. 14), while in the “Pale” form this marking divided (Fig. 15). Neither form has the black marking reaching to the front edge of the forewing as in *T. discrepans* (Fig. 16), which like *T. conographa* has falcate (hooked) wingtips (Britton, 2009). *T. conographa* has a wingspan of about 24mm.

Termessa nivosa (Walker, 1865) (Fig. 17), Common (1990) gives the range as from central New South Wales to Victoria. Marriott (2009) states southern Queensland to Victoria. This fits with my records from southern Queensland. The larvae have been found under loose bark on eucalypts (Froggatt, 1907). *T. nivosa* has a wingspan of about 26mm.

Oeonistis altica (Linnaeus, 1768) (Fig. 18), is in Common (1990) as *Oeonistis entella*, which was shown in the Checklist to be a junior synonym. It has a distribution from northeast Queensland to as far south as Mackay (Common, 1990). It also occurs overseas and has a wingspan of about 40mm. The larvae are whitish grey with a black dorsal stripe and greyish setae, the head and legs pale brown. The larva feed on lichens, *Flacourtia* (Flacourtiaceae) and *Ficus* (Moraceae) (Holloway, 1988).

In preparing this article I am indebted to Lee Curtis for the use of her image as a base for Lois Hughes’s cover painting.

I am also indebted to Dave Britton (Australian Museum) for the use of his image of *Temessa discrepans*.

All other images are by myself. Also many thanks to Dr. Margaret Greenway who helped in the retrieval of reference articles.

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PRESIDENT'S REPORT FOR 2012 AGM

The publication of our magazine "Metamorphosis Australia" has once again been a major activity of the Club. Its success would not have been possible without the many, many contributions of dedicated members and I again thank you all for this. I urge you to continue this tradition in the coming year.

Financial support by the Brisbane City Council through their environmental grants programme has made colour printing of the magazine possible. In 2010 this funding was not available, additional costs of printing and postage occurred and the Club's cash reserves have dwindled. I have applied for a further grant this year and foreshadow a small increase in our annual membership fee to restore our financial position.

We participated in fewer public displays last year with the June IndigiScapes weekend and the Society for Growing Australian Plants sale in September being the main events. I thank those members who provided invaluable support on those weekends. There were lots of butterfly host plants sold in September and you can help by donating plants this year.

It is indeed unfortunate that Butterfly Plants for Poverty has ceased activities due to lack of volunteer support. There is still a good deal of interest in re-establishing habitats and the need to promote butterfly host plants is vital. The Club's host plant book continues to be popular. Remember that we have quite a range of books and posters for sale to members at reasonable prices.

There were some field trips in the last year that were of great interest to those who could come along. Alisha is about to complete her PhD and will be free to make her enthusiastic contributions to excursions again soon.

I cannot thank Daphne enough for all that she does. The magazine is a quarterly reminder to all of her editing skills but it is "behind the scenes" where she contributes meticulous detail and communication to get things right. As well as this, with patience and diligence, Daphne fields a wide range of questions and requests that come in. Then there are those membership records, reminders etc....

We all continue to appreciate and admire the wonderful artwork of Lois together with her anecdotes on their production. Rob ensures that our finances are all in order and John provides his detailed scientific backup of articles. I again thank all three for their support.



In the coming months, I wish to have the long awaited mistletoe field guide published. I have also been working with Club member Hongming Kan on a new website and should have this finalised soon.

Last year I expressed a felt need that the Club needs an infusion of younger ideas into its management and believe that the coming year should be the last one where I will take on the role of President. Please lend your support.

Ross Kendall

ITEMS OF INTEREST

Life history notes on the Lyell's Swift, *Pelopidas lyelli lyelli* (Rothschild, 1915) Lepidoptera: Hesperidae - Wesley Jenkinson

This skipper butterfly is frequently encountered along much of eastern Queensland east of the Great Dividing Range into north-eastern New South Wales. During favourable wet seasons it may penetrate further inland. Recently, during March 2011, I discovered a male near the Chain Lagoons, 15km northeast of Taroom with Rod Hobson (Resources Ranger DERM). John Moss and I also recorded the species at Kroombit Tops National Park in April 2011. These two records are outside the mapped distribution shown in Braby 2000.

This species occurs in a varied range of habitats, having a preference for wetter open forests and woodlands where it is associated with tall grasses.

The adults can easily be confused with many of the 'brown' skippers, particularly with their close relative the Dingy Swift (*P. agna*) in the same genus. To correctly identify this species it is preferable to retain voucher specimens.

Within Queensland, individual specimens show slight variation in the size of the white forewing spots.

Adult flight is very rapid. Typically while basking they settle on grass or low lying vegetation with their wings open, facing towards the sun, revealing the upper side markings. Males can be observed defending open glades (where the host grasses are present), chasing off other males and typically returning to the same perching spot. The females also frequent the same areas looking for suitable ovipositing sites. The males don't appear to hilltop. Both sexes are readily attracted to a wide range of small native and introduced flowers.

Wingspans for the pictured adult specimens are: males 31mm and females 34mm.





Pelopidas lyelli lyelli (Lyell's Swift)

Images left to right: male, female, male underside, female underside

In March 2009, an ovipositing female fluttered slowly around an unidentified host grass and briefly settled, laying an egg singly on the upperside of a leaf. The wing remained closed while ovipositing occurred.



This egg was collected and raised in captivity through to an adult on the exotic Johnson Grass (*Sorghum halepense*). It was white, smooth, dome shaped and approximately 1.0 mm wide x 0.7 mm high.

Left freshly laid egg, right pre-emergent developing larva.

The larva hatched at approximately 9.00am and consumed only the top of the eggshell to emerge. A shelter was later constructed by cutting a small section of leaf above and below the larval position creating a curl. The outer edge of the curl was then stitched back to the leaf with silk. The shelter was then later lined with a thin layer of silk. Typical of skipper larvae, it rested in the shelter during the day and emerged at night to feed towards the leaf apex. It completed five instars and reached a length of 45mm.



1st instar larva



1st instar larva inside shelter, showing chewing from the leaf edge



3rd instar larva



4th instar larva





Pupa dorsal view



Pupa lateral view

The pupa, measuring 32mm in length, was located on the edge of the container. It was attached with silk by the cremaster and a central girdle. The butterfly emerged around midday.

Egg duration was 4 days, larval duration was 32 days while pupal duration was 11 days.

Within the new boundary of the Scenic Rim Regional Shire south of Brisbane, I have records of adults from March through to July, being more numerous during April and May. The species is generally uncommon in this locality. It occurs more commonly north of Brisbane and can be very common in northern Queensland during the late wet season.

References:

Braby, M.F., 2000. *Butterflies of Australia – Their Identification, Biology and Distribution*. vol 1. CSIRO Publishing, Melbourne.

Moss, J.T.St. L, Jenkinson, W.J. Preliminary report for Queensland Parks and Wildlife Service of a survey of butterflies at Kroombit Tops National Park from 21st to 23rd April 2011. Unpublished report.

Photos Wesley Jenkinson

Tiger Crane Fly, *Nephrotoma australasiae* (Skuse, 1890) Diptera: Tipulidae. – Hilton Selvey

Crane flies (Family Tipulidae) are long spindly-legged Diptera found in almost all regions including remote islands. These flies vary in length from a few millimeters to 60mm. Some authorities claim that there are some 14,000 species, though others claim a more modest number of 4,000. There are 60 species in Australia. At least two species are common around my home in Mooloolah. The Tiger, so called by reason of its striped abdomen (Fig. 1) has a body length of 15mm and the antennae are simple and banded (Fig. 3). The second species (unidentified) has a similar body length but has long feathered antennae like a moth (Fig. 2). These crane flies appear to be a good source of food for the local spiders.



Fig. 1. Tiger Crane Fly





Fig. 2. Crane Fly showing feathered antennae



Fig. 3. Showing banded antennae

No one who has watched a dragonfly in flight can fail to be impressed with its manoeuvrability. It can hover, go up or down, fly fast or slow. This astonishing insect's flying ability is due to 4 long and narrow wings and the ability to beat the wings very rapidly.

Diptera, having only a single pair of wings, do not share this flying ability. However, the second pair of wings is replaced by structures called halteres, which improve the flying ability somewhat (Fig.1). Not all flies have a pair of halter. Some like the housefly have only one. The Tiger Crane Fly's halteres are 17.5 % of the wing length, but many Diptera, like the March fly, have much shorter halteres.



Fig. 4 Hair sensilla on halter



Fig. 5. Hair sensilla on wings

Halteres consist of a short stalk at the end of which is a small knob (Fig. 4). They vibrate in a vertical plane at the same rate as the wings but in anti-phase, that is to say, when the wings go up the halteres go down. The centre of mass of the knob is behind the line of the

stalk. This is a very strange arrangement since the stalk is a rigid structure except for some flexibility of the base on the ventral surface. There has to be a twisting strain in one direction with an up stroke and a twisting strain in the opposite direction on the down stroke.



The base of the halter is well supplied with sensilla, which send messages to the central nervous system of the insect with information as to their position and the direction of flight of the insect. The stalk of the halter, the terminal knob in Tiger Craneflies and the leading and trailing edges of the wings are covered in short hair sensilla. These are mechanoreceptors, responding to touch and possibly the flow of air over the wing and the halters (Fig. 4 and Fig. 5). As the fly moves forward the knobs of the halters pass through an arc of a circle and the pair may be regarded as a gyroscope. This keeps the fly on an even keel and flying in a straight line. If the insect yaws the halters tend to maintain the same plane of vibration and will tend to correct the yaw. If the yaw is not corrected, the halters rapidly assume the equilibrium position.

The need for a weight at the end of the shaft of the halter is the gyroscopic force produced, but the logical place for the centre of mass of this knob is in line with the shaft. That the centre of mass is behind the line of the shaft must have some special significance, which must be the twisting force that occurs as the halters move up and down. What could be the point of this strange arrangement and how is it detected? There are special sensors called campaniform sensilla and large numbers are present on the bases of the halters and the bases of the wing. These sense strain and from each sensillum there is a single nerve connection to the insect's brain. This enables the insect to be aware of the position of the halters and this information may be crucial to its flight. The same applies to the hair sensilla that are found along the shaft of the halters, the terminal knob and the leading edges of the wings.

All vertebrates are aware of the position of their limbs and whether they are vertical or lying down. The nerve impulses giving this information are called proprioceptors. Clearly insects have the same system, the information garnered from the sensors as described above.

Reference

Chapman R.F. 1998. *The Insects* 4th Edition, pp 195-17, 216-17. Cambridge University Press, London
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Thanks are due to Enid Selvey for her skill in downloading and printing my pictures.

Field notes on butterflies in the Society Islands, French Polynesia: Part 2: Tahiti Nui (Section 2 – a transect study on Mt Marau) - *Kelvyn L Dunn*

Introduction

This follow-on section details a butterfly-transect study done along the Mount Marau road during a stay in French Polynesia, in March 2007. The access road passes through varied habitats as it rises into the upland interior of Tahiti Island, enhancing its attraction for this purpose, as some butterflies can be habitat-specific. Six transect



components are outlined below. Anecdotal field notes (compiled ad hoc and presented similarly) then follow but the data gathered provide, at best, a snapshot of the local fauna due to a paucity of observations achieved under the prevailing weather. This paper refers to Figures 19-24; these appeared in the March issue, in the first section of Part 2 on pages 17-18 – see Dunn (2012). It also refers to two figures (41 & 46) that will appear in a forthcoming section.

Location: Mt Marau is a very accessible upland region in Tahiti. For that reason, and its varied topography, it seemed an ideal place for a spatial study of butterflies. I utilised the access road as a butterfly-transect making sight-records and photographing adults (where able) from an elevation of about 350m (at the road junction) to about 1375m (at the ridge towers and for a short distance along the spine-ridge trail). A rather limited butterfly fauna made visual identifications easy (only four species were seen in about 14 hours in the field) but their general scarcity compromised information gathering. The access road was surveyed largely on foot (once up and back each day). Adult butterflies were recorded if they were detected within about 15m of the road shoulders (a reasonable visual range to identify and inspect adults whilst hiking).

Habitats: The roadside habitat varies according to elevation with five structures recognised. Agro-forest characterises the lowlands, secondary scrubs are prominent at mid range, and tropical montane cloud forests occur above about 900m. The lower cloud forest is characterised by a tree-fern understorey (*Cyathea* spp; Cyatheaceae) (Fig. 29), but higher up the tree-fern cloud forest merges with, and is replaced by, a second type of cloud forest, dominated by *Alstonia* (Apocynaceae) and *Weinmannia* (Cunoniaceae) (Fig. 30). On the ridge plateau and summit area dwarf *Weinmannia* forest-*Meterosideros* (Myrtaceae) shrub-lands predominate (Meyer 2010).

Logistics and environmental constraints: The monsoon season between November and April can be very wet and ‘cloud forest’ – the dominant vegetation in the upland – is aptly named as it is routinely shrouded in mist. It is likely then that where cloud forest exists it may be hard to find those resident butterflies – more often than not hidden among foliage, awaiting a glimpse of sunshine to enable flight activity. Pape’ete averages two metres of rainfall annually and three quarters of that falls during the wet season, and most commonly from December to February (Cole et al. 2006). That said, due to rapidly changeable weather experienced during the survey, the ascent and descent was, by necessity, repeated twice (over two consecutive days) in order to optimise survey coverage at particular altitudes. Each of the 11 sectors (of the transect) received variable sampling events and observation times (rather than structured time intervals and equal numbers of visits). Some sectors were walked less than four times if they were compromised by localised low-lying cloud, drizzle and lingering mist – unsuitable weather in terms of butterfly activity – or if the time of day (on some visits) was sub-optimal for survey. At such times, if the opportunity



arose, I hitchhiked to another sector that was experiencing more suitable weather. I caution here that hitchhiking, although logistically convenient for my purposes, involves a small but appreciable risk to personal safety and is not endorsed in this paper as a practice for naturalists and tourists. Placing this in perspective though, I reflect that many an early naturalist in the 19th century, including Charles Darwin – one of the first to venture into the interior of Tahiti to study its fauna – faced much greater perils to personal safety during fieldwork than one might today!

Physical description: The Mt Marau access road is a single-lane ‘no through road’ that extends 10.8km into the upland interior of Tahiti Island. It runs south-east by east for the first six kilometres or so, then runs more or less east for another four kilometres. The (unmarked) zero point was presumed to be at the junction where the access road commences its ascent, and thereafter it is sectioned at one-kilometre intervals by established road-markers. At the time of the survey, bitumen extended for about the first one and a half kilometres (from the base junction) and thereafter the road was variably gravel-surfaced or graded. The average incline is only about 10% (ie 1000 metres in height over a distance of 10 kilometres) making it quite suitable for hiking in the tropics but this is offset by the heat index, which can be high in the middle of the day. There is no defined walking trail though, and the road itself is without formal pedestrian access and narrow in places, but was safely walked due to the low volume of traffic – less than half a dozen vehicles used it over the two days concerned. The first tower (close to the 10km point) is about 1375m above sea level (a.s.l.) and the second is about 800m farther along the escarpment at a similar elevation. A short distance (about a hundred metres) along the spine-ridge trail (commencing from tower 2) was also included in the survey, bringing the transect length close to 11km. The ridge trail, which is without signage, initially heads south-east by south ascending a small hill to about 1415m (Fig. 21). Beyond there I believe it follows the ridge crest, at a similar elevation, then slowly curves eastward descending towards a sharp vertical massif, which can be seen beyond the north-east face of the scarp (see Fig. 22), about 2.5km beyond tower 2. None of this escarpment appears to exceed 1430m, so it cannot be the summit. The official elevation of Mt Marau is 1493m (Cole et al. 2006) but there was no French signage indicating where the highest point was or how to get there from the second tower. Hence, I ended the transect-study at an elevation of about 100m lower than I had expected would be the case.

Elevations and approximate geocodes: All road elevations given in this study have been derived from Google Earth’s satellite maps and are relative to a ridge elevation measured as 1375m with that tool. Coordinates for road-markers were derived from these maps by measuring the road distances after the event (not by a carried GPS device). For that reason they are rather generalised, rounded to 0.1 minutes as the final significant figure in which the mathematical error likely lies. Two maps are



provided; the first shows the road marked at kilometre intervals and its location relative to the airport (Fig. 31) – from where the meteorological data was derived – and the second, an enlargement, shows the site of tower 2 and the spine-ridge trail (Fig. 32). Readers may wish to visit GoogleEarth.com (at 17°36' 37"S, 149°31' 56"W), magnifying that image to an 'eye-altitude' of about 2km (as measured by the scale), to appreciate the awesome geography.

Meteorology: On the days of the study: sunrise was at 0600h, sunset at 1815h and solar noon occurred at 1208h TAHT (Tahiti Time). Day length: 12 hours and 15 minutes (Weather Underground 2012).

Day 1 (First ascent): 11 Mar 2007. *Observation time:* from base to base (unmarked zero point at road junction) 0945-1700h (7 hours & 15 minutes of continuous observations). *Weather:* generally sunny, but dense mist shrouded ridge and plateau (Sectors 9 to 11), with a persistent dense cloud layer about 100m below, obscuring visibility in the upland (Sectors 8 & 9). **Meteorology:** Pape'ete airport (at sea level). *Temperature:* constant 31°C recorded between 1000h and 1600h, with slight drop to 30°C by 1700h (the duration of most of the survey). *Humidity* varied from 66% to 70%. *Heat index* varied from 36.4°C at 1000h, peaked at 37.6°C between 1100-1300h, and dropped to 35°C at 1700h. *Wind speed* varied from 14.8-18.5km/hr, predominantly NE. Mostly cloudy throughout day with part cloud recorded at 1400h. (Weather Underground 2012).

Day 2 (Second ascent): 12 Mar: 2007. *Observation time:* from base to base 0910-1550h TAHT (6 hours & 40 minutes of continuous observations). *Weather:* intermittent sunny periods with heavy cloud cover and drizzle at times across most sectors.

Meteorology: Pape'ete airport (at sea level). *Temperature:* rose from 31°C (at 0900h), fluctuated variably up to 33°C at 1200 and again at 1400h, then declined to a constant 31°C between 1500h and 1700h. *Humidity* varied from 54% to 70% (dependent on cloud cover). *Heat index* varied from 36.4°C at 0900h, peaked at 40.6°C at 1400h, and dropped to 36.4°C by 1700h. *Wind speed:* varied from 14.8-22.4km/hr, mostly ENE. Mostly cloudy until 1300h with part cloud or scattered cloud recorded to 1700h. (Weather Underground 2012).

Field Notebook Species Inventory: Mt Marau Road (near Pape'ete Airport)

Sector 1: 0km – <1km (meaning: from zero point up to but not including 1km marker). Habitat: agro-forest (elevation: about 350-460m). [0km site: 17°34.7'S, 149°35.2'W].

Day 1 – Ascent: 0945-1000h. Weather: sunny.



Day 2 – Ascent: 0910h-ca.0920h. Weather: sunny moments amidst heavy clouds and drizzle.

Day 2 – Descent: ca.1520-1550h. Weather: sunny and hot.

No butterflies were seen in this sector during three events involving a total of 55 minutes observations.

Sector 2: 1km – <2km. Habitat: agro-forest (elevation: about 460-630m). [1km site: 17°35.1'S, 149°34.7'W].

Day 2 – Ascent: at 1km roadside marker (ca. 460m): 0930-0945h. Weather: sunny.

Lampides boeticus – Several adults were seen patrolling along roadside at 0930h (territoriality was likely linked to a site of emergence and/or oviposition).

Euploea lewinii (locally ssp. *walkeri*) – One was seen patrolling above flowering snakeweed (*Stachytapheta* sp.; Verbenaceae) at 0945h (territoriality was likely linked to a foraging site).

Sector 3: 2km – <3km. Habitat: agro-forest – secondary scrubland (elevation: about 630-770m) [2km site: 17°35.4'S, 149°34.4'W].

Day 2 – Ascent: at 2km roadside marker (about 630m). Weather: sunny.

E. lewinii – One was photographed whilst perching in dense understorey (1000h).

L. boeticus – One was seen flying along roadside (1000h).

Sector 4: 3km – <4km. Habitat: secondary scrub (elevation: about 770-860m) [3km site: 17°35.7'S, 149°34.1'W].

Day 2 – Ascent: no butterflies were seen in this sector in spite of sunny weather (ca.1005h-ca.1015h).

Sector 5: 4km – <5km. Habitats: tree-fern cloud forests (Fig. 29) and *Weinmannia* moss-laden cloud forests (Fig. 30) (elevation: about 860-960m) [4km site: 17 35.9'S, 149 33.9'W].

Day 1 – Ascent: I had hitchhiked from about the 1.5km point (as no butterflies had been seen after 20 minutes of walking in optimal sunny weather) to this sector – survey recommenced in more suitable habitat with continued sunshine.

Phalanta gabertii – One was seen at 1005h about 4.5km along road (elev. about 900m at 17°36.0'S, 149°33.8'W) near beginning of the more pristine forests.

Day 1 – Descent: no butterflies were seen within this sector (or at lower altitudes) during late afternoon that day (ca.1645h); I then hitchhiked to the base.

Day 2 – Ascent: about 4.5km along road at 1020h. Weather: sunny.

Nacaduba tahitiensis – one (almost certainly this species) was seen in tree-fern dominated cloud forest, flying about *Weinmannia parviflora* (Cunoniaceae).

P. gabertii – Three were seen flying speedily along roadside but none settled.

L. boeticus – Two adults were seen in flight at a distance– both presented as rapidly flying, pale grey lycaenids, cruising about 1m above ground. Neither settled to enable a close view to confirm identifications, but they were almost



certainly this species in my judgement. (*Catochrysops* is a differential identification here; it occurs in Tahiti (Tennent 2006); but the two butterflies did not evoke memories of the Tahitian Blue (*C. taitensis*), which I had seen in Vanuatu three years earlier and which I considered among a small suite of contenders).

Sector 6: 5km – <6km. Habitat: upland tree-fern-dominated cloud forest and roadside scrubland (elevation: about 960-1100m) [5km site: 17°36.2'S, 149°33.7'W].

Day 1 – Ascent: at unsigned ('Puna'aula') lookout with views of the western coast near Puna'aula and seaward to Mo'orea Island in the north-west (situated on a U-bend with an off-road parking bay, just beyond the 5.5km point at an elevation of about 1070m; 17°36.4'S, 149°33.4'W]. Habitat: scrubland. Weather: sunny.

P. gabertii – One was seen flying near lookout (1020h).

E. lewinii – A few were seen flying lazily along roadside (c.1020h).

L. boeticus – One was seen flying near Avocado tree at lookout (1020h).

Day 1 – Descent:

L. boeticus – One was seen flying near rattle-pods (*Crotalaria* sp.; Fabaceae) at the 5km roadside marker; it settled on grass adjacent to these herbs at 1640h (Fig. 33).

Day 2 – Ascent: at 5km roadside marker: 1045h. Weather: sunny.

P. gabertii – One was seen flying speedily, during sunshine, along the roadside.

Day 2 – Ascent: at unnamed ('Puna'aula') lookout: 1050-1110h. Weather: sunny period quickly followed by light rain.

N. tahitiensis – Two were seen flying about *W. parviflora* amidst tree-fern-dominated cloud forest. They appeared dark brown in flight, typical of others seen at a higher altitude and whose identifications had been confirmed by very close inspections.

L. boeticus – One adult was seen flying low along roadside herbage; it presented as pale grey in flight. Although not seen at close range, it was reasonably accepted as this species (rather than *C. taitensis* – see comments for the 4.5km site in Sector 5).

Sector 7: 6km – <7km. Habitat: Tropical montane *Weinmannia*-dominated cloud forest (elevation: about 1100-1200m) [6km site: 17°36.4'S, 149°33.3'W].

Day 1 – Descent: at the 6km roadside marker.

L. boeticus – Two females were seen flying about rattle pods at 1615h. Once settled they were easily approached and identified with certainty.

Day 1 – Descent: about the 6.5km point (elevation: about 1150m, 17°36.5'S, 149°33.1'W).

N. tahitiensis – One was seen flying (during a sunny period) in cloud forest at 1535h.





Fig. 29. Tropical montane cloud forest dominated by a tree-fern (*Cyathea* spp.; Cyatheaceae) understorey; Mt Marau road (Sector 6).

Fig. 30. Tropical montane cloud forest dominated by *Weinmannia parviflora* (Cunoniaceae) in Sector 8, below the plateau.

Fig. 31. Map showing residential area behind the airport and road walked to the summit. Numbered pointers indicate the approximate sites of road markers (point zero at road junction to point 10 near tower 1; point 11 is the site of tower 2). (Google Earth, 29 Jul. 2006, Copyright 2012 & reproduced in accordance with site requirements).

Fig. 32. Map enlargement, showing view of the spine-ridge trail that extends several kilometres south-east by south of tower 2 (point 11). (Google Earth, Copyright 2012).

Fig. 33. *Lampides boeticus* at the 5km site (about 960m above sea level) perched on grass overlooking *Crotalaria* (a known food plant of this butterfly elsewhere in the Pacific) on 11 Mar. 2007, 1640h TAHT. (Sector 6).

Fig. 34. Growth form of *W. parviflora* in cloud forest with reddish/coppery hue of budding racemes in the uppermost foliage.



Sector 8: 7km – <8km. Habitat: *Weinmannia*-dominated cloud forest with roadside *Lantana camara* (Verbenaceae) (elevation: about 1200-1240m) (see Fig. 23). Based on their appearance and behaviour, I am confident that all of the adults of *Nacaduba tahitiensis*. (Objectively, though, none was seen close up or could be photographed to check fine characters and so eliminate a differential identification of the related species, *N. catochloris*, at this lower elevation. However no evidence of that latter species was found during my survey and it may not occur together with *N. tahitiensis*). [7km site: 17°36.5'S, 149°32.9'W].

Day 1 – Descent: at the 7km roadside marker.

N. tahitiensis – one adult was seen at 1525h.

Day 1 – Descent: about the 7.5km point (elevation: about 1200m, 17°36.4'S, 149°32.8'W).

N. tahitiensis – Adults were localised and common here. Some were seen flying near roadside *Lantana* (Verbenaceae), seemingly patrolling a foraging site, albeit none was seen to feed. Others were seen patrolling near *W. parviflora* during a sunny period at 1520h. Adults were often seen flying about *Weinmannia* trees that were in process of budding. Those particular trees were conspicuous by the reddish hue of their racemes amongst the greenery of the forest (Fig. 34).

Day 2 – Descent: heavily overcast in mid afternoon in this sector. As no butterflies were active I hitchhiked from the 7.5km point, having departed about 1510h, (and recommenced observations just below the 1km road-marker (Sector 1) where, at that altitude, the habitat was sunlit – and likely had been since about 1300h based on weather details from the airport recording site).

Sector 9: 8km – <9km. Habitat: Tropical montane cloud forest (elevation: about 1240-1300m) [8km site: 17°36.4'S, 149°32.7'W]. In this sector (near the 8km roadside marker) there is an unsigned viewpoint – a sheer cliff face of nearly 600m – overshadowing the Punaruu River valley (about a kilometre almost directly below). From this precipice, which is just below the summit plateau, the two towers can be seen from the road-shoulder (see Fig. 19). Awed by what seemed like the land's end, I paused for a moment and contemplated an existential component of what could also be included in the concept of a 'devil's elbow'! That said, one should drive *very slowly* along this narrow and unsurfaced section of road particularly when approaching that unexpected U-bend, which was (and likely still is) without guardrails. I had hitchhiked unknowingly past this section (the sheer drop then cloaked in mist) on my first ascent and, on hindsight, ... luckily with a local driver! Day 1 – Descent: along the roadside at the 8km marker.

N. tahitiensis – A few adults were seen flying in cloud forest amongst the upper foliage of *Weinmannia* trees at 1450h. They were actively patrolling, during periods of translucent sunshine, those trees bearing reddish racemes (at the



budding stage). These trees, I suspected might be a larval host plant (Figs 30, 34 & 35) – deduced in the field from my repeated observations of localised associations of this butterfly along the transect-walk, interfused with learned experience of correlating nature's cues. Although too high up to visually sex the adults, I supposed that most were males and were likely defending an oviposition site or site of emergence (places where female butterflies are more likely to be present). Indeed, similar local associations in other polymmatine lycaenids have intuitively assisted my recognition of larval hosts in the past (see Dunn (1990) for an example from the *Candalides*). (Interestingly, and serving as a parallel example from another group of lepidoptera, Williams and Marriott (2012) have recently offered their insightful clues on how one can determine the likely larval hosts of Geometrid moths). Hence, I confidently provide this host link at this time of report as both intuitive supposition and good probability.

Day 2 – Ascent: at unsigned 'Punaruu River valley lookout' (Elev. about 1240m) during a sunny moment amidst periods of misty cloud cover.

N. tahitiensis – One or two were seen perching (at 1130h) on a *Weinmannia* tree overhanging the precipice. During moments of sunshine the adult(s), likely male(s), pursued elliptical patrol flights, returning to the perch on the outermost leaves each time. The territorial focus likely combined a landform and a potential host.

Day 2 – Descent: at 8km roadside marker: Weather: overcast.

N. tahitiensis – One was seen roosting on a ground fern (at 1455h) during unsuitable weather. It held its wings closed above the body (the usual stance at such times).

Sector 10: 9km – <10km. Habitat: *Weinmannia*-dominated cloud forest (elevation: about 1300-1375m). [9km site: 17°36.4'S, 149°32.4'W].

Day 1 – Descent: at the 9km roadside marker, at an elevation of about 1300m.

N. tahitiensis – One unsexed adult was seen feeding repeatedly (at 1430h), several metres above ground (in the middle-canopy of cloud forest) at red bottlebrush-like flowers of *Metrosideros collina* (Myrtaceae) (see nectar host in its habitat: Fig. 36). It walked among the stamens, sequentially probing its proboscis deep into the nectar glands (Fig. 37), before flying briefly and landing a little farther away on the same flower spike (Fig. 38), where it recommenced foraging for nectar. It was determined as this species by a zoom lens-enhanced video sequence, which captured the green hind-wing patterns enabling certain identification. This represents the first foraging host record for this species on a native plant.

Sector 11a: 10km (tower 1) – <10.8km. Habitat: dwarf *Weinmannia*-dominated cloud forest (elevation: about 1375m). [10km site: 17°36.5'S, 149°32.2'W].

Day 1 – Descent: 1335-ca.1410h.



N. tahitiensis – A silhouetted male was photographed (about 1350h) whilst perching, about 4m above ground, on canopy foliage of *Weinmannia*. During sunny periods this male flew short patrols, returning each time to perch on nearby leaves of the same tree. The territorial focus of that male appeared to be one or more *Weinmannia* trees bearing crimson budding racemes (Figs 35 & 46) about which many adults were actively flying.

Day 2 – Descent: 1420-1430h. I commenced descent from tower 2 at 1420h and reached the first tower after 10 minutes. Weather: Sunny initially, but light rain set in on reaching tower 1. No butterflies were seen flying in this sector on this visit, likely due to poor weather.

Sector 11b: 10.8km point at Tower 2 and on the ridge trail beyond. Habitat: dwarf, moss-laden, cloud forest and low shrub-lands (elevation: about 1372m). [Ridge track site: 17°36.6'S, 149°31.9'W]. (Total of 5 hours & 5 minutes spent in this sub-sector).

Day 1 – 1050-1335h (2 hours & 45 minutes). Weather: dense misty cloud shrouded the summit most of the time with occasional sunny periods experienced. A mat of low-lying cloud obscured the steep Fautaua and Tipaerui valleys below. Butterflies occasionally flew along the escarpment near the cliff-clinging *Lantana* (see Fig. 20). More frequent patrol flights occurred a short distance along the spine-ridge trail, where adults perched at times.

P. gabertii – several fresh males were seen patrolling low down, atop of vegetation along the ridge trail; they flew speedily and rarely settled during sunshine. Only one adult chose to bask on the ground and it did so warily, with wings held flat, until disturbed by approach of observer, whereupon it rapidly departed.

N. tahitiensis – Many males were seen rapidly patrolling the spine-ridge at foliage height (about 1m above ground); their extensive metallic green dusting beneath was clearly seen once perched (Fig. 24 – previous section). In flight they generally looked dark brown but sometimes flashes of metallic green were visible when they flew at or near observer's eye-level, and superficially presented like a *Jamides* rather than a *Nacaduba*. Other males were seen perching on ground ferns and prominent shrubs from 1-1.5m up (at 1140h). Here I easily inspected several adults at very close range and confirmed the identification of each as this species.

L. boeticus – Two old males were seen patrolling the *Lantana*, which clung to the precipice, adjacent to the perimeter fence of tower 2; once settled, both adults were inspected and their identifications were confirmed.





Fig. 35. Budding racemes and new foliage of *W. parviflora*.

Fig. 36. *Metrosideros collina* (Myrtaceae): a native foraging host of *N. tahitiensis*, seen overhanging road from mid canopy level, at an elevation of about 1330m, near the 9km road-marker (Sector 10).

Figs 37 & 38. An adult of *N. tahitiensis* feeding at scarlet spike-flowers of *Metrosideros collina* (Myrtaceae), in mid canopy, about 1330m above sea level. (11 Mar. 2007, 1430h TAHT).

Fig. 39. Anterior view of male *Phalantha gabertii*; perched and intently watching observer with camera! Alert and ready for a departure flight. (12 Mar 2007, 1250h TAHT).

Fig. 40. Anterior-lateral view of same male *P. gabertii*, roosting during cool weather on 12 Mar. 2007, 1250h TAHT. (Sector 11).



Day 2 – 1200-1420h (2 hours & 20 minutes). Weather: variably overcast, with some sunny periods; it rained at the summit from 1315 to 1330h. An absence of low-lying cloud below the summit enabled unobscured views of valleys and Pape'ete much of the time.

P. gabertii – A few males were seen at 1230h vigorously patrolling the spine-ridge at a height of 1-2m above ground; none settled during sunshine. A male was photographed whilst roosting during overcast weather at 1250h; his eyes sparkled emerald-green and remarkably matched the colour of the foliage (Figs 39 & 40).

L. boeticus – A mating couple was seen flying during light rain near the *Lantana* growing adjacent to the perimeter fence of tower 2. It had been disturbed by observer's approach and settled quickly on low foliage (at 1305h) (Fig. 41).

N. tahitiensis – At 1220h, one was seen to alight on a *Lantana* flower adjacent to the perimeter fence of tower 2. However, the flower head dropped off its petiole as soon as the adult settled, startling it to flight again. The encounter was too brief to see its proboscis extended for several seconds to confirm a foraging intention. Nonetheless, I judge this instance as likely evidence of a second (albeit introduced) nectar source for this species. At 1225h, during light cloud cover, one male was seen basking, with wings held in wide-V shape, on a ground fern frond about 30cm above ground on the spine-ridge. At 1230h, once the summit had brightened again, many adults recommenced patrol flights along the spine-ridge; they rarely settled during sunshine, and instead used these times for aerial mate location and defence of territories. On one occasion (at 1315h) an adult was seen flying during light rain – changeable weather meant that adults could be caught unexpectedly in flight during cool snaps. Their requirement to roost at such times (within the narrow patrol area) aided photographic opportunities. However, the adults often selected as their landing substrate, vegetation on the precipitous slope – which was inaccessible – rather than foliage that was adjacent to the track.

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Photos Kelvyn Dunn

More than a botanical refuge

Myall Park Botanic Garden via Glenmorgan, Western Downs, Queensland

Robert Whyte www.arachne.org.au

The widely acknowledged value of Myall Park Botanic Garden's plant diversity brings with it a treasure trove of investigations into other aspects of biodiversity. As well as over 200 locally native species of the Brigalow Belt plant community including old growth brigalow and buloke, over 700 Australian plants from arid and semi arid regions have been established here. Have these plants brought with them or attracted the fungi, lichens and invertebrates necessary for the complex food webs in their original habitats? How does the biodiversity of the planted areas of the garden compare with the surrounding remnant bushland, and other remnant or disturbed areas nearby? Arachnologist Robert Whyte visited the gardens in January to begin a series of surveys to answer some of these questions.

The weather was ideal, cool sunny days with the promise of rain to sweeten the air. The Central-western Queensland oil and gas economy had ensured bitumen nearly to the front gate. We got away early and looked forward to a late lunchtime arrival.

Myall Park Botanic Garden occupies 130 hectares near Glenmorgan, between Tara and Surat. It is a four-and-a-half hour drive from Brisbane — around five hours with a meal break.

The geology of the site is a shallow, light textured forest soil known as Minnabilla soil, with occasional rocky ridges. It supports mixed acacia and eucalypt, cypress, angophora and buloke woodland.

There is no major watercourse within the gardens site itself, but there is a dam at the north east corner and a nearby lagoon.

When doing invertebrate surveys in areas like this it is best to choose a relatively simple, repeatable method of observing and capturing specimens. It is not so much a matter of finding and identifying every plant, animal, lichen and fungi species as it is choosing a target group like spiders, or ants, and recording some benchmark data about the number of families, genera and species as a measure of diversity.





Left: The iconic spider of the Western Downs and nearby inland regions of dry sclerophyll forest is *Austrocanthia minax*, the Christmas Jewel Spider, one of Australia's most photographed animals. This black, yellow and gold jewel can be seen in most parts of Australia, on a scanty web, and sometimes in groups of many overlapping webs.



Above: This view of the female is more likely to be seen in the wild than the one above. The male, bottom right, is much less commonly seen than the female and hardly ever photographed.

Why Spiders?

Spiders tell us a lot about the ecology of the areas they inhabit. Apart from a few ant-eating specialists most spiders are generalist predators whose food source is a wide range of insects and other arthropods.

By looking at spiders we can infer much about broader arthropod populations, especially insects. The spiders you see would not be able to survive in your survey location without something to eat. Unlike birds and other vertebrates, spiders are mostly restricted to their immediate surroundings. It is true just-hatched spiderlings, being nearly weightless, can balloon great distances into new habitats, but once having arrived they are unlikely to balloon again.



Many invertebrates other than spiders can be chosen for biodiversity surveys and ideally a range of several animal classes would be studied, only restricted by the number of experts on hand to identify the species.

On this occasion it was spiders I was looking for, and I was keen to see how the animals might differ to those found in Coastal South East Queensland, with which I was more familiar. Sampling different areas of the gardens would tell me about the influence of plant habitats. Resampling the same or nearby quadrants several times over many years might tell me how climate, season, and other factors might affect populations.



A display specimen in the gardens near the beginning of the Chinchilla track running along the southern edge of the garden towards the west then looping back.



The cottage shown here was originally the manager's house, a three bedroom affair with a generous kitchen and family room. The Chinchilla track starts just beyond it.

Methods and materials

The survey method used was to mark off a 10m by 10m quadrant then carefully inspect it visually to see if there were any obvious webs, spiders on bark or spiders running across the ground.

This was followed by beating foliage into a white plastic tray 60mm x 40mm x 15mm deep. The contents of the tray were then examined with the aid of a hand lens. Spiders were identified to family, genera and species and non-duplicate species were collected in tubes for photography, inspection by microscope and ultimately addition to Queensland Museum collections.

Later, some shrubs, especially flowering ones, were sampled throughout the gardens in various locations, also by beating into a tray.

The conditions generally on the Western Downs were quite lush, due to recent rains and two years of the last four having high rainfall, substantial rainfall having fallen in all four years since the drought broke in 2008. The conditions on the ridge where the gardens were located were generally harsher than the surrounding pasture or croplands, the site being chosen for its compatibility with the more arid and semi-arid



area Australian species being sought for botanical display. Some planted areas are regularly watered with a timing system.

The amount of flowering plants throughout the gardens support pollinating insects of all types, while deep leaf litter has an abundance of slaters, click bugs, bush cockroaches and other scuttling, slithering, hopping and jumping food parcels.

A few of the findings

The first quadrant chosen, T100A, was near to the Avochie cottage about 20 metres to the south of the Chinchilla Track —27.207427° S 149.654598° E. It has been flagged with yellow tape. A stunted acacia was in the centre of the 100m² area. Four trees, one of them dead, were at the four corners. The dominant vegetation at ground level was *Themeda triandra* (Kangaroo Grass), with some rushes, mostly *Lomandra* spp. and other tussocky grasses not identified.

During the visual inspection a large adult female and noticeably silvery *Deinopes rubrifa* (Netcasting Spider) was recorded moving swiftly at ground level, a colony of around 80 *Delena cancerides* (Crab-like or Social Huntsman) were observed under the bark of the dead tree on the north western corner, and a large *Lampona* sp. (White tailed Spider), on the same tree. Webs on the wattle tree at the centre contained *Leucauge granulata* (Silver Orbweaver) and *Cyrtophora moluccensis* (Tentweb Spider) as well as the common kleptoparasite in Orbweaver's webs *Argyrodes antipodiamus* (Dewdrop Spider).

The most obvious feature of this quadrant was its ant fauna. Ants were visibly the dominant macro-invertebrate. This observation was reinforced in the next sweep with the tray, with the discovery of many ant-mimicking spiders. These spiders, with representatives from many families, live among ants, avoiding detection by their convincing mimicry, or stealth, or even by emitting ant pheromones.

The more convincing the ant mimicry, the less likely you are to spot them. You'll be watching carefully until you suddenly say, "Hey, that's not an ant!" There were some beautiful ground-running gnaphosids in this category.

For other families, camouflage is their trick. You find yourself saying: "Hey, that piece of bark is moving, and it's got eight legs." Often, bark spiders are *Stephanopis* sp. a type of crab spider.

The white tailed spider, *Lampona* species living under bark next to the colony of large huntsman spiders was probably plucking young sparassids from their nest like a raptor plucking musk lorikeets from the sky. *Lampona* species can pass as ants to the casual eye.

The T100A quadrant was, at first glance, a harsh and bare site. The amount of diversity and abundance though was very high. The relatively undisturbed nature of the area gave lots of tussocks, nooks, crannies, and leaf litter for critters to hide and



go about their daily activities. The colony of 80 large huntsman spiders already mentioned was an indication of the available prey. Where there are spiders there must be insects to eat, especially at night. The astonishing variety of ants, so numerous it was impossible to sit on the ground while counting specimens, would have provided some food, though ants are notoriously unpalatable and can be feisty.

It is wise to not get one's hopes up when visiting a new site. Having high expectations so often leads to disappointment. First impressions in this case were pretty much business-as-usual. There were a lot of interesting looking spiders, often grey to brown and less than 5mm in length.

As the results for the first quadrant began being studied more closely, what had looked like many examples of the same genera, even the same species, turned out to be wildly different genera, even different families. Observations of this kind suggest the action of convergent evolution, where many different animal lineages end up looking and behaving like one another.

Diversity and abundance was lower in the second quadrant, T100B, where a group of *Eremophila* spp. have been planted. These plants, although flowering, supported fewer spider species, although the results here might have been skewed by the difficulty of sampling the shrubs. More spiders and other invertebrates may have been found at the inaccessible hearts of the shrubs, impossible to get at with the beating method.

My weekend spidering yielded very impressive biodiversity — 17 families with 40 genera and 49 species. The most obvious, diverse and populous family was Salticidae, jumping spiders. There were many known ant fanciers among them including *Lycidas*, *Holoplatys*, *Ocrisiona* and *Zenodorus* spp.

The method of sampling used tends to result in a high proportion of day-feeding or day-wandering hunters. This does not represent the whole range of what's out there, more of which could be found by means of pitfall traps and night collecting. It does however give us a repeatable method and one which can reveal interesting trends when different areas are sampled and compared.

As is often the case therediids, the so-called comb-footed spiders with irregular, messy space webs were the next most found spider group. These spiders are often overlooked due to their very small size, many below 3mm in body length.

Next most often found were araneids, one of the most commonly found families of orb weavers Australia-wide. More araneids would have been found at night, in their webs. These spiders usually hide during the day.

A scattering of lynx spiders and crab spiders is also consistent with South East Queensland, whereas the higher number of obvious lamponids, gnaphosids and zodariids live up to the inland's reputation.





Left: male and right: female Lynx spider in the genus *Oxyopes*. This species is almost certainly a new record for Australia. The Oxyopidae is a barely studied group in Australia despite its representatives being very common. Most species have not been redescribed for the modern era, and all we have to consult is the first major work on Australian spiders, *Die Arachniden Australien* by Koch and Keyserling, a multivolume work published in the late 1800s.



The most spectacular find of the trip, this spider has been identified as *Thyene* by a world authority on jumping spiders Dr Jerzy Prószyński. This is a new genus for Australia. Because this spider crept around very stealthily I gave it the nickname 'Brothel Creeper'. Jerzy shortened it to just 'Creeper'. About 4.5mm body length, its massive front legs are held up in front of its face.



The Netcasting Spider, *Deinopes subrufa*, has huge rear middle eyes. It is one of very few types of spiders with dramatically enlarged eyes, one of the other groups being jumping spiders. In both cases the enlarged eyes give them superb eyesight. The netcasters rely on their excellent night vision to throw their silken nets like cast nets onto their prey.





An ant-mimicking gnaphosid. This small spider in was a very effective ant mimic. Its behavior has become very ant like, even to the extent of waving its front legs like antennae. The marks on the abdomen give the appearance of ant body segments.



Phoroncidia sextuberculata, a common spider throughout coastal and inland Queensland. This photo shows the male from above. It is a very small spider, less than 2mm in height and length. In front of the eye region you can see the 'boxing gloves' this male uses to mate with the female. She has the 'lock' to these 'keys'.



A spectacular male *Lyceidas* sp. jumping spider



A male *Paraphilaeus daemeli* jumping spider



The grotesquely beautiful *Tmarus cinerascens*, a crab spider



A rarely seen *Deliochus* sp. an orb weaver



Robert Whyte, with co-author Dr Greg Anderson, is currently writing "A field Guide to the Spiders of Australia" for CSIRO Publishing. He contributes regular updates on his discoveries and learnings as he spiders his way across Australia. While his main area of focus is arachnology, Rob explores interesting questions in ecology and biodiversity and may even profile the occasional insect, which he calls 'six-legged spiders'. Photos Robert Whyte

FACEBOOK

Attention Facebook users!

Recent changes to Facebook and the introduction of the new 'timeline' format have somehow resulted in the removal of most of BOIC's 'friends'. I have no idea how this happened. Please re-friend/like/join if possible!

Now that my PhD is coming to an end I will have more time to post onto Facebook. I'll also update it as often as I can with details of upcoming club field trips and excursions. Please let Alisha Steward know if you have any questions: a.steward@griffith.edu.au

BUTTERFLY AND OTHER INVERTEBRATES CLUB PROGRAMME

Planning and Management Meeting – 18th August, 2012

Lowlands Festival

What: We will be holding a display at this event. This FREE family fun day will have something for everyone! Get outside and alive and enjoy our fantastic local environment. See the Radical Reptiles and Geckos Wildlife presentations or bounce in the jumping castle. Local community groups will share their knowledge with you on how to protect our unique fauna and flora species. Enjoy the APEX BBQ, face painting and Bunning's bird box building. Take home a native plant from the FREE tree giveaway, enjoy a river walk amongst the mangroves and get the opportunity to take home a 1.5kw grid connected solar system from Springers Solar as it's the lucky door prize just for coming along on the day.

When: 26th August 2012 from 11 am – 3.00 pm

Where: Osprey House Environment Centre, Dohles Rocks Rd, Griffin

Revisiting a 2006 butterfly host planting at Eprapah - Rescheduled

What: The butterfly host plants in the garden of the scout premises at Victoria Point have grown in leaps and bounds. Those who had visited previously will see an enormous difference especially in the extent of the Birdwing vines and the other native vines for Purple Crows, Four-bar Swordtails, Banded Awls etc.

When: **Saturday 1st September, 2012**

Where: Meet 9 am at the picnic table just inside the Victoria Point Scout premises on the corner of Cleveland/Redland Bay Rd & Colburn Ave, UBD 226 D2 (need to approach from the north -- Cleveland direction for easiest access). If the gate looks closed it will only be "dummy locked". Park inside. Bring your morning tea, camera, binoculars (for the Mistletoe Birds!) and insect repellent (for the mozzies of course!)

RSVP: IMPORTANT: register with John Moss 3245 2997 or email johntimmoss@gmail.com, who may have some passenger space in his car leaving 8.30 am from Capalaba/Sheldon.

SGAP Spring Flower Show and Plant Sale

What: We will be holding a display at this event. Members looking for butterfly/moth hostplants may find something interesting amongst the plants for sale.

When: **15th and 16th September, 2012**

Where: The Auditorium, Mt. Coot-tha Botanic Gardens



DISCLAIMER

The magazine seeks to be as scientifically accurate as possible but the views, opinions and observations expressed are those of the authors. The magazine is a platform for people, both amateur and professional, to express their views and observations about invertebrates. These are not necessarily those of the BOIC. The manuscripts are submitted for comment to entomologists or people working in the area of the topic being discussed. If inaccuracies have inadvertently occurred and are brought to our attention we will seek to correct them in future editions. The Editor reserves the right to refuse to print any matter which is unsuitable, inappropriate or objectionable and to make nomenclature changes as appropriate.

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- Those members who have sent in letters and articles
- Lois Hughes who provided the cover painting
- Daphne Bowden who works on layout, production and distribution
- John Moss and Dan Bickel for scientific referencing and proof reading of various articles in this issue of the magazine

We would like to thank all these people for their contribution.

ARE YOU A MEMBER?

Please check your mailing label for the date your membership is due for renewal. If your membership is due, please renew as soon as possible. **Membership fees are \$30.00 for individuals, schools and organizations.** If you wish to pay electronically, the following information will assist you: BSB: **484-799**, Account No: **001227191**, Account name: **BOIC**, Bank: **Suncorp**, Reference: your membership number and surname e.g. **234 Roberts**.

Butterfly and Other Invertebrates Club Inc.
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Next event – Lowlands Festival - 26th August 2012 from 11 am – 3.00 pm
See Programme for details

